

Method and device for the production of a thin-walled part

The invention relates to a method for the production of a thin-walled part, especially a pipe section, and a device for that purpose.

Prior Art

Parts are required and produced in many and diverse forms and executions at the present time. For example, parts are formed from a metal strip by punching or precision blanking. Previously disclosed by DE 199 53 059 A1, for example, is a receiving bearing for receiving and/or moving at least one reading head arrangement, in which two plate elements are set at a distance and positioned exactly. This is effected by means of spacer elements, which are formed from the plate element by precision blanking and/or cold-forming.

Previously disclosed by CH 636 542 is a method for the production of flared bushes and flared bushes, in which the deep-drawing process is used. For this purpose, the starting material is supplied to a series of deep-drawing stations, so that a kind of cup is produced. The base of the cup is then perforated, in conjunction with which the liberated material is forced to the side. Further deep-drawing processes are then performed until production of the flared bush is complete.

The present invention is concerned with the production of cylindrical structural members or, for example, pipe sections. It is concerned in particular with the production of cam rings for assembled camshafts intended for installation in internal combustion engines. The individual cams are manufactured today as a forging blank with subsequent machining and cutting from a precision pipe and with subsequent forming without cutting.

Object of the Invention

The object of the present invention is to make available a method and a device of the above-mentioned kind, with which thin-walled parts can be produced with high precision. In addition, unlike conventional precision blanking, the weight of the material and the proportion of the material cost should be significantly reduced.

Achievement of the Object

The characterizing features of patent claim 1 lead to the achievement of this object.

This means that a pipe section, for example, can be manufactured by the precision blanking metal forming process. The special feature of the production process is that punching or precision blanking is conventionally performed on the thick-walled plate, and forming is performed on the thin-walled component by cold-forming. Material wastage can be

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reduced to a minimum in this way. In addition, thin-walled pipe sections are produced to the required precision, for example with a tolerance of 1/10 in the thickness deviation and a dimensional accuracy of ± 0.06 . No pipes of this kind, from which such pipe sections can be cut, are currently available on the market.

Patent Claims

1. A method for the production of a thin-walled part (33), especially a pipe section, in which a strip (1) of material is clamped between a clamping plate with a cavity (4) and a guide plate (3) to guide a drawing die (6), and a contour for the part (33) is drawn by the drawing die (6) in the cavity (4) in the clamping plate (2), after which cutting of an inner contour (17) followed by ironing of a wall area (11) of the part (33) between the inner contour (17) and the rest of the strip (1) of material takes place, and then an outer contour of the part (33) is cut from the strip (1) of material and the part (33) is ejected.

2. The method as claimed in claim 1, characterized in that the wall (11) of the part (33) is bent at an angle from the strip (1) of material by the drawing die (6).

3. The method as claimed in claim 1 or 2, characterized in that the thickness (s) of the wall (11) of the part (33) in relation to the thickness of the strip (1) of material is reduced by the drawing die (6).

4. The method as claimed in one of claims 1 to 3, characterized in that, in conjunction with ironing of the part (33), its wall (11) is formed by about 90° in relation to the strip (1) of material.

5. The method as claimed in at least one of claims 1 to 4, characterized in that, in conjunction with ironing of

the part (33), its wall thickness (s) is reduced in relation to the thickness of the strip (1) of material.

6. The method as claimed in at least one of claims 1 to 5, characterized in that the part (33) is calibrated after parting from the strip (1) of material.

7. The method as claimed in at least one of claims 1 to 6, characterized in that, between cutting of the inner contour (17) and ironing, at least one further bending of the wall (11) of the part (33) takes place.

8. The method as claimed in at least one of claims 1 to 7, characterized in that the part is a pipe section (33), which is placed on a bar-shaped or pipe-shaped shaft of a camshaft with cams arranged thereon and is secured thereto.

9. The method as claimed in claim 9, characterized in that the pipe sections (33) are secured to the shaft by welding.

10. The method as claimed in claim 8 or 9, characterized in that the pipe sections (33) are executed with an egg-shaped cross-section.

11. A device for performing the method as claimed in at least one of claims 1 to 10, characterized in that, for the purpose of cutting the inner contour (17), a cutting die (16) is guided in a further guide plate (10), which with an inclined pressure wall (13) makes contact with the wall area (11) of the part (33), so that the latter is held between the pressure wall (13) and a supporting surface (12) of a

clamping plate (9), in conjunction with which the supporting surface (12) at least partially envelops an opening (18) into which the cutting punch is introduced.

12. The device for performing a method as claimed in at least one of claims 1 to 11, characterized in that, for the purpose of ironing the wall area (11) of the part (33), a drawing die (23) is guided in a guide plate (19) and a clamping plate (24) exhibits a corner bead (25) to receive the wall area (11).

13. The device for performing the method as claimed in at least one of claims 1 to 12, characterized in that, for the purpose of cutting the outer contour, a cutting die (26) with a cutting edge (27) is guided relative to a guide plate (29), in conjunction with which the cutting die (26) exhibits an indentation (28) on its cutting edge (27), between which or an opening wall of the clamping plate (30) the wall (11) of the part (33) is present.

14. The device for performing the method as claimed in at least one of claims 11 to 13, characterized in that the guide plate (10, 19, 29) is provided with a knife-edged ring (14).

15. The device for performing the method as claimed in at least one of claims 8 to 14, characterized in that the part is a pipe section (33), which can be placed on a bar-shaped or pipe-shaped shaft of a camshaft with cams arranged thereon and can be secured thereto.

16. The device for performing the method as claimed in claim 15, characterized in that the pipe sections (33) are secured to the shaft by welding.

17. The device for performing the method as claimed in claim 15 or 16, characterized in that the pipe sections (33) exhibit an egg-shaped cross-section.